NICE^3 Technical Periodic Report #1

1. Title / State / Company

Precision Irrigation Technologies for the Agricultural Industry
Colorado Office of Energy Management and Conservation
Colorado Corn Administrative Committee

2. Periodic Activity Summary - In a narrative format, briefly describe the technical progress for the period.

Valmont and Quality Irrigation have installed the Accu-pulse systems at the Yuma and Wiggins demonstration host sites and have begun the process of adjusting and updating the equipment. Servi-tech and Y-W Well Testing have begun initial field assessment and evaluation at the Yuma and Wiggins demonstration host sites. Servi-tech, Y-W Well Testing, and Quality Irrigation have all embarked on their continuing education programs targeted toward internal technical personnel as well as representatives of Northeast Colorado's agricultural industry. USDA-ARS is preparing to commence software and documentation development. Colorado Corn Administrative Committee is working with DOE Golden Field Office to set baseline metrics for which to compare data gathered throughout the project and is designing a conference presentation for early 2001.

3. Milestone Table

a) Describe technical progress for the period, with ongoing activities and discuss the actions taken to meet the milestone deadlines.

The Accu-pulse systems were installed at the Yuma & Wiggins sites during the period of June 5th - 8th. Valmont Industries provided two crews of three men and Quality Irrigation provided two crews of two men, with installation going on at both sites at once. Both Accu-pulse systems were initially run with water only to allow for the calibration of the systems as needed to assure optimum application uniformity. A rework was performed on the electrical control panel at the Wiggins site to provide for better system shutdown in the event of a failure. The same work was performed at the Yuma site on July 20th. Crews winterized each system in September to avoid problems with freezing of the components. The field at Yuma has been harvested and the yield maps have been given to Servi-Tech.

Y-W Well Testing began work on this project in May 2000. Technicians made a total of 20 trips to the Wiggins and Yuma demonstration host sites for field assessment and evaluation during this year's crop season. These visits were made to set and read gypsum blocks, conduct soil tests, and conduct well tests.

Servi-tech started work on this project in late September 2000. Technicians made two visits to the Wiggins and Yuma demonstration host sites after this year's corn harvest. These visits were made for initial site assessment and for soil compaction evaluation. Servi-tech's first major task was to acquire GPS hardware, laptop computer, and associated software needed for this project and spend time meeting with the Servi-tech GPS specialist to get the computer and software set up. Technicians have spent approximately 4-5 days with the GPS unit to familiarize themselves with its function. Lastly, technicians are in the process of gathering the yield data to go along with the VERIS data provided by USDA. Servi-tech technicians are continuing to familiarize themselves with GPS and related software programs, and are gathering yield data information from the USDA-ARS and demonstration host sites.

b) Provide an explanation of technical difficulties encountered while testing, installing, or operating the system.

On July 18th, a Quality Irrigation crew was dispatched to the Wiggins site. They attempted to raise the boom sections of the Accu-pulse system higher to avoid dragging on the crop and interfering with the water pattern. The boom sections were temporarily strapped to the trusses. The lifting method for the Accu-pulse system is not adequate for use in corn or other tall crops because the crop drag damages the system's boom hoses. The Accu-pulse system, when in the raised position, also interferes with the water pattern of commonly used truss level drop packages.

c) Explain the steps taken to resolve these difficulties.

Valmont and Quality Irrigation personnel have been discussing ways to overcome this problem. A design change will probably be made in the support components along the entire length of the system. The lifting mechanism will be redesigned this winter.

d) Describe any known or potential changes in milestone dates.

The date for Milestone 1 should be changed to 1/15/01. Colorado Corn Administrative Committee and USDA-ARS are currently working with the DOE Golden Field Office to compete this milestone.

The date for Milestone 3 should be changed to 12/1/00. USDA-ARS has just acquired access to the necessary personnel to begin work on this milestone.

The date for Milestone 6 should be changed to 6/1/01. Due to the contracts for this project not being completed until August 2000, the production scale commercial demonstration was not able to begin during the 2000 growing season.

The date for Milestone 16 should be changed to 11/1/03, the date for Milestone 17 should be changed to 10/1/03, and the date for Milestone 18 should be changed to 11/1/03. Since the

production scale commercial demonstration was not able to begin during the 2000 growing season, it will thus not conclude until after the 2003 growing season is over.

e) Address activities and planned accomplishments for the upcoming quarter.

The planned installation of the Variable Rate Injection Units is December. The units are now built and will be picked up by Quality Irrigation shortly. The rework on the lifting mechanism will probably be done in February.

Servi-tech will finalize Veris and yield maps, make management zones from those maps, and start soil testing (if the ground has thawed).

USDA-ARS will initiate software documentation and development. Variables integrated into GIS layers will include water, nutrients, vegetative, weed, insect, disease, and yield information provided by Servi-tech and Y-W Well Testing..

4. Discuss results (testing etc.) and their implications to the project. Discuss any necessary or anticipated milestone additions or deletions.

On June 20th the Yuma site was used for an application of herbicide. The application rate was as follows:

- Northstar @ 5 oz. /acre EPA # 100-923
- Accent Sp @ .33 oz. / acre EPA # 352-560
- Ammonia Sulfate @ 2 lbs. / acre
- Acr Activator 90 @ 1 lb. / acre EPA # 36208-50014

The Application was for equal amounts for the entire field. The weed control, although not scientifically measured, appeared as good as or better than the adjoining field that received conventional ground rig application. One of the big advantages of the Accu-pulse for this application is the ability to use far greater amounts of carrier per acre than with conventional application methods. The only problem encountered was the capacity limitation of the borrowed injection unit did not allow for the use of all the Ammonia Sulfate. This problem will be overcome when the Variable Rate Injection Units are installed, as their capacity is greater.

5. Attach publications written that relate to the project (internally or externally produced). List any planned publications or conferences to be attended related to the project for the next quarter.

Quality Irrigation had three of its people attend the Irrigation Association Show in Phoenix November 11th - 13th. This is part of its continuing education program to keep up with the newest technologies in precision agriculture.

At the Rocky Mountain Plant Food and Agricultural Chemical Association annual meeting, Colorado Corn Administrative Committee and DOE Golden Field Office will conduct a two-hour workshop for professional credit for certified crop advisors on the specifics of this project. The workshop is scheduled for January 10, 2001. This will be a power point presentation and attendance will be verified for professional credit for crop advisor attendees.

6. Discuss any key personnel changes (including state, cost-share, subgrantee, and others involved).

N/A

7. Discuss any cost-sharing partner/demonstration partner changes.

N/A

8. Discuss any other topics that are relevant to the scope and progress of the project.

Y-W Well Testing, in conjunction with the NRCS and local SCD, did a Soil Compaction Root Study. The results of the compaction and root penetration study should be available shortly in a report written by Mike Peterson. This study did show compaction as a result of the trucks driven through this field during beet harvest 3 years ago.